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REV. NO. 0

FINAL DRAFT  
FEDERAL FACILITY SITE INSPECTION REVIEW  
KNOLLS ATOMIC POWER LABORATORY  
KESSELRING SITE

PREPARED UNDER  
TECHNICAL DIRECTIVE DOCUMENT NO. 02-9005-13  
CONTRACT NO. 68-01-7346

FOR THE  
ENVIRONMENTAL SERVICES DIVISION  
U.S. ENVIRONMENTAL PROTECTION AGENCY

SEPTEMBER 14, 1990

NUS CORPORATION  
SUPERFUND DIVISION

SUBMITTED BY:

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REVIEWED/APPROVED BY:

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481263



## FEDERAL FACILITY SITE INSPECTION REVIEW FORM

## FIT REGION 2

Site Name: Knolls Atomic Power Laboratory - Kesselring Site  
Aliases: None  
EPA ID No.: NY5890008993  
Address: Atomic Project Road  
City: West Milton  
County: Saratoga  
State: New York

1. Provide the name of document(s) reviewed and the organization responsible for its preparation:

- KAPL Installation Assessment Report - Phase I, April 1986.
- EPA Form 2070-12, Preliminary Assessment Questionnaire, April 15, 1988.
- Environmental Monitoring Report - Calendar Year 1986.
- Environmental Impact Statement, EIS-NY-73-005-5, December 1972.

2. Rating or Priority given: HRS  $S_m$  = 17.3. (KAPL recommended that a site inspection not be conducted; instead, continuation of existing monitoring programs was recommended).

Check one ☐ Agree (go to line 6)

☒ Disagree (go to line 3)

☒ No priority given (go to line 4)

3. If disagree, why?

Based upon information provided by Knolls Atomic Power Laboratory (KAPL) and additional references cited in this Site Inspection (SI) Review, it is concluded that the report does not accurately represent the potential hazards associated with the site, for the following reasons:

- The KAPL assessment considered the population using the aquifer of concern to be limited to residents located in an area between Hogback Road Landfill and Glowegee Creek. As a result, KAPL derived an HRS score of 17.3 for the Hogback Road Landfill. This score, however, addressed only a small fraction of the population using the aquifer of concern within a 3-mile radius of the site. Consideration of the entire groundwater population within a 3-mile radius of the site indicates the need for a listing site inspection.
- The KAPL assessment reported an individual HRS score for each of five identified waste units and did not consider the combined effect of the units, because the areas are geographically separated. The conclusions were based upon the highest individual waste unit score, which was determined to be 17.3. Consideration of the waste units as an aggregate however, and using the corrected groundwater population, indicates the need for a listing site inspection. Based upon the following relevant factors, the site units should be evaluated on an aggregate basis:
  - The waste units were part of the same operation.
  - There is one potential responsible party.
  - Contaminants from the units can reach the same groundwater and surface water.
  - There is a single target population.

- Additional background information, as discussed under Item 8, below, is needed for a valid site assessment.
- Additional areas of concern, listed in Part I of this review, may contribute to site contamination. For the site Security Area, data reported subsequent to KAPL's assessment indicate the presence of radioactive contaminants in groundwater. Further information is needed concerning the areas listed in Part I.
- For some areas, complete information does not exist regarding the nature of the wastes deposited.

4. Is information adequate to provide a recommendation?

- ☒ yes (go to line 6)  
☐ no (go to line 5)

5. If information is not adequate, check the type of information needed to complete the SI Review, then go to line 7.

- |   |  |
|---|--|
| <input type="checkbox"/> Waste source type(s)     | <input type="checkbox"/> Site slope                                  |
| <input type="checkbox"/> Containment              | <input type="checkbox"/> Topography                                  |
| <input type="checkbox"/> Physical state of waste  | <input type="checkbox"/> Surface water use                           |
| <input type="checkbox"/> Hazardous constituents   | <input type="checkbox"/> Location of sensitive environments          |
| <input type="checkbox"/> Hazardous waste quantity | <input type="checkbox"/> Surface water population                    |
| <input type="checkbox"/> Aquifer description      | <input type="checkbox"/> 1-mile radius population                    |
| <input type="checkbox"/> Overlying geology        | <input type="checkbox"/> 3-mile radius population                    |
| <input type="checkbox"/> Groundwater use          | <input type="checkbox"/> 4-mile radius population                    |
| <input type="checkbox"/> Groundwater populations  | <input type="checkbox"/> Potential for fire and explosion conditions |
| <input type="checkbox"/> Location of wells        | <input type="checkbox"/> Accessibility of hazardous waste            |

6. Is there sufficient environmental sampling data to support the migration assessment and to evaluate any potential imminent health threats?

- ☐ Yes  
☒ No

7. FIT Recommendation:

A Listing Site Inspection is recommended for the KAPL-Kesselring site.

8. Comments (if any):

The United States DOE Knolls Atomic Power Laboratory (KAPL)-Kesselring Site is an active federal facility located near West Milton, in Saratoga County, New York. The 3,900-acre facility is owned by the United States government, and has been operated by General Electric Company since its inception in 1949. The site operations involve research and development in the design and operation of naval nuclear propulsion plants and reactor cores. A single prototype nuclear reactor was installed in 1949. There are presently four pressurized-water nuclear reactors at the site. Support facilities include training, laboratory, and equipment service areas; cooling towers; boilers; a radioactive water treatment system; retention basins; and a sanitary wastewater treatment plant. These facilities are located at the Security Area, which occupies approximately 35 acres.

The property is located in a rural, wooded area. Site surface waters drain eastward to Kayaderosseras Creek, which discharges to Saratoga Lake several miles downstream of the site. Kayaderosseras Creek and its tributaries at the site are classified by New York State as Class C surface waters. There are no known surface water intakes for potable water within 3 miles downstream of the site. Within 4 miles of the site, groundwater is the only supply of potable water. The majority of wells draw from surficial aquifers. A wellfield located at the Kesselring site provides water for on-site potable and service uses. Some of the surface waters at the site are believed to be hydraulically connected to shallow groundwater.

KAPL completed a site assessment in April 1988. Based upon an HRS score of 17.3, KAPL recommended that a site inspection not be conducted; continued monitoring was recommended. This score, however, represented only one waste unit; moreover, only a small fraction of the total population that may use the aquifer of concern was included in the ranking. The 1988 report was largely based upon the facility Installation Assessment Report, prepared in 1986, as well as the site's Environmental Monitoring Report - Calendar Year 1986 and a site environmental impact statement. Five identified waste units were reported (Figure 2). The waste units include two landfills and three surface impoundments. Other areas of concern are noted in this SI Review. No RCRA units were addressed by KAPL. The Environmental Monitoring Report - Calendar Year 1989, however, does list a RCRA permit for the facility. Among hazardous chemical wastes reported to have been generated and disposed of at the site are included chlorinated organics, unspecified solvents, polychlorinated biphenyls (PCBs), oily wastes, mercury, silver, lead debris, asbestos, paints, unspecified laboratory wastes, and sulfuric acid containing lead. It was reported that these wastes were deposited in the ground during past practices. For some areas, it was noted that information concerning hazardous waste types is not complete. While there are no areas designated for radioactive waste disposal at the site, KAPL reported that at two areas (the Silo Area and a tank containing tritium), radioactive contamination of soil and groundwater, respectively, is present due to former operations. The PA reported that radioactive and hazardous chemical wastes are now shipped to off-site disposal facilities in accordance with applicable regulations.

Environmental monitoring associated with the site includes: liquid effluent monitoring for radioactivity and chemical parameters; environmental assessment of liquid effluents, receiving water, fish and sediment for radioactivity; annual aquatic life surveys; air emissions monitoring for radioactivity and opacity; continuous radiation monitoring at perimeter and off-site locations; air sampling upwind and downwind of the site; and groundwater monitoring that has recently been implemented. Data available subsequent to KAPL's assessment indicate elevated radioactivity levels in groundwater at the site Security Area. The site Environmental Monitoring Report - Calendar Year 1986 reported that the site maintained a high degree of



compliance with permit requirements, and that average exhaust air concentrations were in compliance. The 1986 report summary also stated that KAPL is in full compliance with the U.S. DOE regulations governing the release of radioactivity to the environment. KAPL's report did not present a file review of monitoring reports, possible environmental incidents, and agency interactions with the facility for years spanning the operations history of the site. Such information would be needed for a full site assessment.

The following factors have limited the effectiveness of the KAPL assessment in applying the Hazard Ranking System (HRS) in accordance with CERCLA:

a. Deficiencies in assessment of migration routes and targets.

- The population using the aquifer of concern was underestimated, resulting in a greatly lowered rating, as discussed earlier in this SI Review. HRS rating factors selected by KAPL also differed in some instances from those determined in this review, in regard to facility slope, toxicity/persistence and permeability; waste units were scored individually rather than as an aggregate.
- Nearby domestic potable water wells were not sampled.
- Additional areas of concern such as the Security Area were not addressed. Monitoring data reported for 1989 indicate the presence of radioactive contaminants in groundwater at the Security Area. Areas of concern listed in this SI Review should be addressed.

b. Information gaps.

- KAPL's report did not present file search documentation for years spanning the operations history of the facility, with information concerning monitoring reports, possible environmental incidents, and agency interactions with the facility. Furthermore, it is not known if agency comments were made regarding the site's Installation Assessment Report, Environmental Impact Statement and annual environmental monitoring reports. Such information is necessary for a valid assessment of the site.
- An assessment should be made concerning site-specific analytes of concern for evaluation.

c. Analytical Data QA/QC.

- While KAPL maintains a QA program for analysis of effluent and environmental samples, it is not known if the program would meet Environmental Protection Agency (EPA) criteria. It appears that data validation in accordance with EPA guidelines was not conducted.

d. Sampling QA/QC.

- It is not known if the sampling reported by KAPL would meet EPA QA/QC criteria. Sampling and documentation procedures were not described.

(The site groundwater data for 1989 illustrate some potential QA/QC deficiencies. For some analytes, such as mercury, the reported detection limits exceed those required under CERCLA. In regard to sampling QA/QC, KAPL attributed groundwater radioactivity to the entry of particulates to groundwater due to structural damage to wells; KAPL attributed the presence of low levels of organics in groundwater to field contamination. In addressing the facility sampling program, well specifications and the locations of monitoring wells and other sampling locations should be evaluated. Site reports have not included sampling and analytical QA/QC documentation).

This SI Review concludes that a **LISTING SITE INSPECTION** should be conducted at the KAPL-Kesselring facility, based upon the following considerations:

- The 3-mile radius population is wholly dependent upon groundwater for its water supply and primarily uses the shallow aquifer.
- Deposition of radioactive and hazardous chemical waste in the ground, including locations of highly permeable soil and shallow groundwater, has been documented.
- Elevated levels of radioactivity in soil and groundwater have been detected.
- There is a lack of complete information regarding the nature and quantity of wastes disposed of on site.
- Additional potential waste areas of concern exist.
- A complete review of monitoring, possible environmental incidents, and agency actions over the course of the site's history is needed.
- The need exists for sampling and analytical QA/QC and reporting that complies with EPA/CERCLA criteria.

9. FIT Reviewer: Chris Bumpis

Date: February 12, 1991

# FEDERAL FACILITY SCREENING SITE INSPECTION REVIEW REPORT

## PART I: SITE INFORMATION

1. Site Name/Alias Knolls Atomic Power Laboratory - Kesselring Site

Street Atomic Project Road

City West Milton

State New York

Zip 12020

2. County Saratoga

County Code 091

Cong. Dist. 24

3. EPA ID No. NY5890008993

4. Block No. 1

Lot No. 1

5. Latitude 43° 02' 30" N

Longitude 73° 57' 30" W

USGS Quad. Middle Grove, New York

6. Owner U.S. Department of Energy

Tel. No. (518) 395-6366

Street P.O. Box 1069

City Schenectady

State New York

Zip 12301

7. Operator General Electric Company

Tel. No. (518) 395-6366

Street Atomic Project Road

City West Milton

State New York

Zip 12020

8. Type of Ownership

☐ Private

☒ Federal

☐ State

☐ County

☐ Municipal

☐ Unknown

☐ Other

9. Owner/Operator Notification on File

☒ RCRA 3001

Date Not Reported

☐ CERCLA 103c

Date

☐ None

☐ Unknown

## 10. Permit Information

Permit	Permit No.	Date Issued	Expiration Date	Comments	
				Other Information	In Compliance
SPDES(1)	NY0005843	Not Reported	9/1/93	Site Outfalls	Yes(2)
RCRA(3)	NY5890008993	Not Reported	(4)	RCRA waste	Yes
SWMF(5)	(6)	Not Reported	(6)	Landfill	(6)
AE(7)	002 A&B	Not Reported	5/31/91	Heating boiler	Yes
AE	003	Not Reported	5/31/91	Heating boiler	Yes
AE	004	Not Reported	5/31/91	Duplicating machine	Yes
AE	006	Not Reported	5/31/91	Shop exhaust	Yes
AE	05A01	Not Reported	5/31/91	Spray paint booth	Yes
AE	05B01	Not Reported	3/21/91	Welding hood	Yes
AE	07401	Not Reported	5/31/91	Welding hood	Yes
AE	07402	Not Reported	5/31/91	Welding hood	Yes
AE	01801	Not Reported	7/23/94	Duplicating machine	Yes
AE	01C01	Not Reported	11/21/93	Cleaning Process	Yes
AE	01C01	Not Reported	11/21/93	Cleaning Process	Yes
AE	03C01	Not Reported	11/21/93	Cleaning Process	Yes
AE	03C02	Not Reported	11/21/93	Cleaning Process	Yes
AE	06C01	Not Reported	11/21/93	Cleaning Process	Yes
AE	T2001	Not Reported	11/23/93	Cleaning Process	Yes
AE	T2002	Not Reported	11/21/93	Cleaning Process	Yes
AE	86G01	Not Reported	11/21/93	Welding hood	Yes
AE	86D01	Not Reported	7/2/94	Carpentry Shop	Yes
AE	86D02	Not Reported	(6)	Lagging Shop	Yes
AE	09201	Not Reported	(6)	Welding Hood	Yes
AE	TGC01	Not Reported	2/28/94	Cleaning Process	Yes
AE	WBC01	Not Reported	8/20/94	Welding hood	Yes
AE	05C01'	Not Reported	10/30/94	Cleaning Process	Yes
HSBSR(10)	5-000070	Not Reported	7/19/91	Chemical Storage	Yes
PBSR(8)	414506	Not Reported	8/17/92	Oil Storage	Yes
RAE(9)	KAPL-188-01	Not Reported	None	Service Facility	Yes
RAE	KAPL-288-01	Not Reported	None	Service Facility	Yes
RAE	KAPL-388-01	Not Reported	None	Service Facility	Yes
RAE	KAPL-488-01	Not Reported	None	Service Facility	Yes
RAE	KAPL-588-01	Not Reported	None	Service Facility	Yes
RAE	KAPL-688-01	Not Reported	None	Service Facility	Yes
RAE	KAPL-788-01	Not Reported	None	Service Facility	Yes

(1) State Pollutant Discharge Elimination System

(2) Occasional excursions beyond permit limits identified and satisfactorily explained in periodic discharge monitoring reports issued in accordance with permit requirements.

(3) Resource Conservation and Recovery Act.

(4) Interim Status (Interim permission to operate authorized by cognizant agency.) The permit number listed is the EPA identification number.

(5) Solid Waste Management Facility.

(6) Operating permit applications being coordinated with NYSDEC.

(7) Air Emission

(8) Petroleum Bulk Storage Facility.

(9) Radionuclide Air Emission.

(10) Hazardous Substance Bulk Storage Registration.

## 11. Site Status

☒ Active☐ Inactive☐ Unknown12. Years of Operation 1949 to Present

13. Identify the types of waste units (e.g., landfill, surface impoundment, piles, stained soil, above- or below-ground tanks or containers, land treatment, etc.) on site. Initiate as many waste unit numbers as needed to identify all waste sources on site.

## (a) Waste Management Areas

Waste Unit No.	Waste Unit Type	Facility Name for Unit
1	Surface Impoundment	Swan School Road Cellar Hole
2	Landfill	Baptist Hill Road Landfill
3	Surface Impoundment	Silo Area - Lee Road
4	Surface Impoundment	Parkis Mills Road Cellar Hole
5	Landfill	Hogback Road Landfill

## (b) Other Areas of Concern

Identify any miscellaneous spills, dumping, etc. on site; describe the materials and identify their locations on site.

1. Site Security (Service Facility) Areas. The facility includes four prototype pressurized - water naval nuclear propulsion plants, laboratory, training areas, and other operations. Waste generation was reported, and the facility has permits for the storage of RCRA waste, hazardous substances, and petroleum, but no information was provided concerning the location of storage tanks or drum storage areas. Monitoring data for 1989 indicate the presence of elevated levels of radioactivity in groundwater at the Security Area. Potential contaminant sources may include but not be limited to the following:
  - a. Four prototype nuclear power plants.
  - b. Cooling towers. Waste cooling water is processed and monitored for radioactivity. Cooling tower air emissions are monitored for radioactivity.
  - c. Four oil-fueled, steam-generating boilers. Boiler blowdown water is processed and monitoring for radioactivity. Air exhaust is monitored for smoke emissions.
  - d. Tritium waste area. It is believed that leakage of a water tank that contained tritium has resulted in soil and groundwater contamination. The PA reports that the tritium contamination exceeds natural background levels but is 1,000 times less than the limits that exist for unrestricted use of water. Investigation by the facility operator has continued in order to determine if potential sources of further tritium contamination exist.
  - e. Radioactive water reuse system. A deionization system processes wastewater containing radionuclides.
  - f. Retention basins. These tanks reportedly hold water containing radionuclides from the reactor plants and associated operations.
  - g. Two surface channels and a stormwater runoff area that discharge to Glowegee Creek may present a potential for soil, groundwater and surface water/sediment contamination.



- h. Lagoon. A lagoon discharges to Glowegee Creek via the two site surface channels. The lagoon structure and contents were not described.
- i. Storage tank and possible drum storage locations. Permits are reported for RCRA waste and for bulk storage of hazardous substances and petroleum, but information concerning the nature and location of materials stored has not been provided.
- j. Sanitary Wastewater Treatment Plant. Waste sludge generated by this secondary treatment system is stored in a holding tank and removed by a subcontractor to a state-approved off-site disposal area. Treated wastewater is discharged to Glowegee Creek.
2. A firing range located near the Baptist Hill Road Landfill has been in use since 1980. It is reported that approximately 2,000 to 3,000 pounds of lead have accumulated in the hillside at this location.
3. A firing range adjacent to Hogback Road Landfill was operated from 1968 to 1980. It is estimated that the total lead accumulation in soil at this area is less than 200 pounds.
4. The PA noted the presence of a 'burn cage' at the Hogback Road Landfill. Soil borings were collected at this location. Potential contaminants and results of analyses that may have been conducted were not addressed.
5. Hogback Road Landfill maps indicate the presence of a buried 1,000-gallon water tank. The area was not addressed in the PA.
6. A previous Preliminary Assessment that was prepared by the Region II FIT office reported the presence of a buried reactor at the site. The structure was not noted in the PA prepared by KAPL.
7. While generation of solid and liquid PCB waste was reported, no information was provided concerning the nature or location of PCB use at the site.

## 14. Information available from

Contact Amy Brochu Agency U.S. EPA Tel. No. (201) 906-6802

Preparer Claire Baruxis Agency NUS Corp. Region 2 FIT Date August 29, 1990

**PART II: WASTE SOURCE INFORMATION**

For each of the waste units identified in Part I, complete the following six items.

Waste Unit 1 - Surface Impoundment, Swan School Road Cellar Hole

1. Identify the RCRA status and permit history, if applicable, and the age of the waste unit.  
This surface impoundment is not a RCRA-permitted unit. The use of this area for waste disposal was initiated in the mid-1950s.
2. Describe the location of the waste unit and identify clearly on the site map.  
This waste unit, a former farmhouse cellar, is located on Swan School Road.
3. Identify the size or quantity of the waste unit (e.g., area or volume of a landfill or surface impoundment, number and capacity of drums or tanks). Specify the quantity of hazardous substances in the waste unit.  
Reportedly, approximately 3,000 pounds of battery acid were disposed of at this unit.
4. Identify the physical state(s) of the waste type(s) as disposed of in the waste unit. The physical state(s) should be categorized as follows: solid, powder or fines, sludge, slurry, liquid, or gas.  
The physical state of the waste was liquid.
5. Identify specific hazardous substance(s) known or suspected to be present in the waste unit.  
Battery acid containing sulfuric acid and lead was disposed of at this unit.
6. Describe the containment of the waste unit as it relates to contaminant migration via groundwater, surface water, and air.  
Waste was disposed of directly into this unit, which had no containment features, such as an impermeable liner, that would prevent migration to groundwater. The PA notes that the foundation of the cellar is no longer visible. The area was leveled several years ago. The unit was considered by KAPL to be a closed basin that would not allow surface migration. It was reported however, that the structure provided unsound diking, which might thus allow surface migration to occur.

Ref. Nos. 1, 2, 3

## PART II: WASTE SOURCE INFORMATION

For each of the waste units identified in Part I, complete the following six items.

Waste Unit 2 - Landfill, Baptist Hill Road Landfill

1. Identify the RCRA status and permit history, if applicable, and the age of the waste unit.

This landfill is not a RCRA-permitted unit. While it was reported that this waste area was open from 1951 to 1986, conflicting information dates its opening in the 1970s.

2. Describe the location of the waste unit and identify clearly on the site map.

This landfill is located on Baptist Hill Road, in the northeastern quadrant of the site, near Crook Brook.

3. Identify the size or quantity of the waste unit (e.g., area or volume of a landfill or surface impoundment, number and capacity of drums or tanks). Specify the quantity of hazardous substances in the waste unit.

Reportedly, approximately 193 tons of waste were disposed of at this landfill.

4. Identify the physical state(s) of the waste type(s) as disposed of in the waste unit. The physical state(s) should be categorized as follows: solid, powder or fines, sludge, slurry, liquid, or gas.

The physical states of the waste were liquid and solid.

5. Identify specific hazardous substance(s) known or suspected to be present in the waste unit.

Wastes known to have been disposed of at this unit include mercury, silver, chromates, and chlorinated solvents. It was reported that asbestos was also disposed of here, and was later removed. Containerized paint was also disposed of and reportedly was largely removed. Other possible wastes include sealer residue, miscellaneous chemicals, and asphalt debris. For a four-year period ending in 1955, all site wastes were disposed of at this area, including waste chemicals and oil. Appendix B of the PA states that comprehensive information concerning specific hazardous wastes present is not available.

6. Describe the containment of the waste unit as it relates to contaminant migration via groundwater, surface water, and air.

The landfill has no containment features, such as an impermeable liner or leachate collection system, that would prevent migration to groundwater. Because the landfill is reportedly underlain by till, however, KAPL considered this unit as if it had an impermeable liner. This waste area was found to be in close proximity to a bedrock fault. This geologic feature might increase the potential for contaminant migration to the bedrock aquifer. It was reported that there is no diversion system, cover material, or run-on control, which would prevent surface migration at the landfill.

Ref. Nos. 1,2

**PART II: WASTE SOURCE INFORMATION**

For each of the waste units identified in Part I, complete the following six items.

Waste Unit 3 - Surface Impoundment, Soil Area - Lee Road

1. Identify the RCRA status and permit history, if applicable, and the age of the waste unit.

This surface impoundment is not a RCRA-permitted unit. Low-level radioactive waste and other materials were processed at this location during the 1950s and 1960s.

2. Describe the location of the waste unit and identify clearly on the site map.

This waste unit is located on Lee Road, in the northwestern quadrant of the site.

3. Identify the size or quantity of the waste unit (e.g., area or volume of a landfill or surface impoundment, number and capacity of drums or tanks). Specify the quantity of hazardous substances in the waste unit.

It was estimated that 150 cubic yards of topsoil with a radioactivity content of 0.05 curie are present at this location. The predominant radionuclides are cobalt-60 and cesium-137. Additionally, it was estimated that up to 50 pounds of mercury were present in soil at this location.

4. Identify the physical state(s) of the waste type(s) as disposed of in the waste unit. The physical state(s) should be categorized as follows: solid, powder or fines, sludge, slurry, liquid, or gas.

The physical states of the waste are believed to be liquid and solid.

5. Identify specific hazardous substance(s) known or suspected to be present in the waste unit.

Hazardous substances deposited at this location include cobalt-60, cesium-137, and mercury. The area was also used for the burning of waste oil and sodium contaminated with mercury. KAPL reported that large unspecified components containing mercury were removed and that soil analysis indicated that mercury residues are not present.

6. Describe the containment of the waste unit as it relates to contaminant migration via groundwater, surface water, and air.

This surface impoundment had no containment features, such as an impermeable liner, which would prevent migration to groundwater. In regard to surface migration, it was reported that the diking is leak-prone and structurally unsound, thus providing no containment.

Ref. Nos. 1, 2, 3

## PART II: WASTE SOURCE INFORMATION

For each of the waste units identified in Part I, complete the following six items.

Waste Unit 4 - Surface Impoundment, Parkis Mills Road Cellar Hole

1. Identify the RCRA status and permit history, if applicable, and the age of the waste unit.  
This surface impoundment is not a RCRA-permitted unit. Disposal in this waste area began around 1960.
2. Describe the location of the waste unit and identify clearly on the site map.  
This waste unit, a former farmhouse cellar, is located on Parkis Mills Road near Glowegee Creek.
3. Identify the size or quantity of the waste unit (e.g., area or volume of a landfill or surface impoundment, number and capacity of drums or tanks). Specify the quantity of hazardous substances in the waste unit.  
Reportedly, 6,000 pounds of battery acid were disposed of at this unit.
4. Identify the physical state(s) of the waste type(s) as disposed of in the waste unit. The physical state(s) should be categorized as follows: solid, powder or fines, sludge, slurry, liquid, or gas.  
The physical state of the waste was liquid.
5. Identify specific hazardous substance(s) known or suspected to be present in the waste unit.  
Battery acid containing sulfuric acid and lead was disposed of at this unit.
6. Describe the containment of the waste unit as it relates to contaminant migration via groundwater, surface water, and air.  
Waste was disposed of directly into this unit, which had no containment features, such as an impermeable liner, that would prevent migration to groundwater. The PA noted that the cellar foundation is no longer visible. It was reported that the structure provides unsound diking, which could thus allow surface migration to occur. The area was leveled several years ago. KAPL considered the unit to be a closed basin.

Ref. Nos. 1, 2, 3



## PART II: WASTE SOURCE INFORMATION

For each of the waste units identified in Part I, complete the following six items.

Waste Unit 5 - Landfill, Hogback Road Landfill

1. Identify the RCRA status and permit history, if applicable, and the age of the waste unit.  
This landfill is not a RCRA-permitted unit. The landfill has been in operation since the early 1950s.
2. Describe the location of the waste unit and identify clearly on the site map.  
The landfill is located at Hogback Road near the southern border of the site.
3. Identify the size or quantity of the waste unit (e.g., area or volume of a landfill or surface impoundment, number and capacity of drums or tanks). Specify the quantity of hazardous substances in the waste unit.  
Reportedly, 115 tons of waste have been disposed of at this 14-acre site.
4. Identify the physical state(s) of the waste type(s) as disposed of in the waste unit. The physical state(s) should be categorized as follows: solid, powder or fines, sludge, slurry, liquid, or gas.  
The physical states of the waste disposed of were solid, powder, and liquid.
5. Identify specific hazardous substance(s) known or suspected to be present in the waste unit.  
Wastes reported to have been disposed of at this unit include lead debris, paints, asbestos, oil, unspecified solvents and chemicals, and laboratory wastes. The PA reports that comprehensive information concerning specific hazardous substances is not available.
6. Describe the containment of the waste unit as it relates to contaminant migration via groundwater, surface water, and air.  
The landfill has no containment features, such as an impermeable liner or leachate collection system, that would prevent migration to groundwater. It was reported that there is no adequate diversion system, cover material, or run-on control, which would prevent surface migration at this landfill.

Ref. Nos. 1, 2

## PART III: HAZARD ASSESSMENT

### GROUNDWATER ROUTE

1. Describe the likelihood of a release of contaminant(s) to the groundwater as follows: observed, alleged, potential, or none. Identify the contaminant(s) detected or suspected, and provide a rationale for attributing the contaminant(s) to the facility.

Subsequent to the site PA, the facility's Environmental Monitoring Report - Calendar Year 1989 reported that elevated levels of radioactivity have been observed in groundwater at the Security Area. The report, however, attributed the radioactivity to solids that may have entered the groundwater due to monitoring well damage. Potential contaminant sources are listed under "Areas of Concern" in Part I of this SI Review. At one location, a leaking tank has resulted in the known release of tritium to groundwater. The 1989 report noted low levels of benzene, toluene, and phenol in groundwater at the Hogback Road Landfill, but the detected analytes were reported to be attributed to field sampling contamination. This report, as well as earlier information, noted an observable effect on groundwater at the Hogback Road Landfill in regard to parameters such as conductivity, total dissolved solids, and chlorides. Quarterly groundwater monitoring has been implemented at the active landfill in accordance with permit requirements.

There is a high potential for contaminant release to groundwater due to the nature of the material deposited directly on the ground at the former waste areas. This material includes sulfuric acid, lead, mercury, silver, chromates, chlorinated solvents, asbestos, radionuclides, unspecified solvents and chemicals, and laboratory wastes. The radionuclides cobalt-60 and cesium-137 were reported to be present in soil at one location. Wastes that were disposed of at the Kesselring site were identified through employee interviews and records of waste management operations for the facility; for some areas, information concerning the nature and quantities of waste deposited is incomplete. The PA noted that a groundwater monitoring program had been initiated at the five identified waste disposal locations. The 1989 annual report stated that a site investigation is being focused on the former disposal sites. Groundwater contamination at the inactive waste areas was not noted.

Ref. Nos. 1 through 5

2. Describe the aquifer of concern; include information such as depth, thickness, geologic composition, permeability, overlying strata, confining layers, interconnections, discontinuities, depth to water table, groundwater flow direction.

The aquifer of concern consists of unconsolidated deposits and underlying bedrock. The surficial deposits consist of till and fairly uniform sands and gravels. Floodplain deposits of silt, clay, fine sand, and gravel are also present. At much of the site, the surficial deposits appear to be underlain by a glacial till. Although this till has a low permeability, it is not continuous throughout the site and therefore does not act as a confining layer. The till can serve as an aquifer in some areas. Thickness of the overburden is generally 20 to 40 feet at the site, and may range from 3 feet near bedrock outcrops to approximately 150 feet near streambeds. The depth to the water table is typically 3 to 8 feet below the ground surface. The majority of wells in the area draw from the unconsolidated deposits. The bedrock underlying the entire site is the Canajoharie Shale, which provides groundwater to several potable water wells. Major bedrock faulting exists in the area.

At the five waste units investigated, highly permeable surficial deposits, as well as less permeable surficial till, have been noted. The estimated permeability of the sands and gravelly sandy loam at the Hogback Road Landfill ranges from  $1.4 \times 10^{-5}$  to  $2.2 \times 10^{-3}$  cm/sec. This landfill is located on a highly permeable kame delta aquifer that feeds Glowegee Creek. Parkis Mills Road Cellar Hole and Swan School Road Cellar Hole are situated above highly permeable outwash sand and kame delta deposits, respectively. Baptist Hill Road Landfill is located in an area of glacial till, and in close proximity to a bedrock fault. At the Silo Waste Area, highly permeable kame deposits are underlain by till and bedrock.

Groundwater at the site is hydraulically connected to Kayaderosseras Creek, Hogback Brook, Glowegee Creek, and an intermittent stream that is located near Hogback Road Landfill. Kayaderosseras Creek feeds an important aquifer in the area, which provides service water to the Kesselring site. Domestic wells near the site draw groundwater from the outwash sands at Hogback Brook. Domestic wells also intercept the groundwater formations that underlie the Hogback Road Landfill and possibly Parkis Mills Road Cellar Hole.

Ref. Nos. 1 through 8, 10, 11

3. Is a designated sole source aquifer within 3 miles of the site?

Although groundwater provides the only source of potable water within 3 miles of the site, none of the formations present are designated as a sole source aquifer.

Ref. Nos. 12, 17

4. What is the depth from the lowest point of waste disposal/storage to the highest seasonal level of the saturated zone of the aquifer of concern?

At two or more of the waste areas, the depth from the lowest point of waste disposal to the highest level of the saturated zone of the aquifer of concern is less than 20 feet.

Ref. Nos. 2, 6 through 8

5. What is the permeability value of the least permeable continuous intervening stratum between the ground surface and the aquifer of concern?

Surficial deposits of widely varying permeability overlie the aquifer of concern. The estimated permeability of these deposits ranges from  $1 \times 10^{-7}$  to  $2.2 \times 10^{-3}$  cm/sec.

Ref. Nos. 2, 6 through 8, 14

6. What is the net precipitation for the area?

The PA reported the net precipitation for the area to be 9.0 inches. Based upon references cited in this review, the net precipitation is 10 inches.

Ref. No. 14

7. Identify uses of groundwater within 3 miles of the site (i.e., private drinking source, municipal source, commercial, industrial, irrigation, unusable).

Uses of groundwater within 3 miles of the site include private potable water supplies, non-municipal community systems, livestock and commercial uses, and service water for the Kesselring site. The site service water is used for drinking and for noncontact cooling purposes. There is no alternate source of potable water within a 3-mile radius of the site.

Ref. Nos. 1, 2, 4, 5, 6 through 8, 10, 11

8. What is the distance to and depth of the nearest well that is currently used for drinking or irrigation purposes?

The nearest drinking water well was reported to be 1,900 feet from the Hogback Road Landfill, based upon the nearest residence indicated in a referenced aerial map. The depth was not specified, but the aquifer drawn from was considered to be the surficial Kame-Delta Complex near Glowegee Creek.

Ref. Nos. 1, 2, 6 through 8, 10, 11, 18



9. Identify the population served by the aquifer of concern within a 3-mile radius of the site.

KAPL considered the population of concern within a 3-mile radius of the site to be represented by up to 20 houses located between the site and Glowegee Creek. The groundwater population was therefore estimated to be 76 people. It was stated that Glowegee Creek would intercept groundwater flow to other houses, and that there was no evidence of groundwater migration beyond this creek. Groundwater monitoring for evidence of migration was not, however, described. Site employees were not included in the groundwater population estimate.

The total residential population within a 3-mile radius of the site is approximately 5,500, based upon USGS topographic mapping and GEMS. Additionally, an unknown number of KAPL employees consume water from the site wellfield. Available well information for the area within 3 miles of site hazardous wastes lists approximately 65 domestic wells and 16 non-municipal community wells. Groundwater is the only supply of potable water within a 3-mile radius, and the great majority of wells draw from surficial deposits. While there may be discontinuities among the surficial aquifers, there does not appear to be sufficient information to support the limiting of the population of concern to that reported by KAPL.

Ref. Nos. 1, 2, 6 through 8, 10, 11, 18

#### **SURFACE WATER ROUTE**

10. Describe the likelihood of a release of contaminant(s) to surface water as follows: observed, alleged, potential, or none. Identify the contaminant(s) detected or suspected, and provide a rationale for attributing the contaminants to the facility.

Site contaminants potentially reach surface waters as a result of effluent discharges and stormwater runoff. Effluents from site operations are discharged to Glowegee Creek under a discharge permit. According to KAPL, some of the liquid effluents discharged to Glowegee Creek contain low levels of radionuclides such as tritium, carbon-14, argon-41, cobalt-60, xenon, and krypton. Among the site operations that result in surface water discharges are boiler blowdown, cooling tower blowdown and overflow, retention basin and lagoon discharges, site cooling water operations, and sanitary wastewater treatment. Effluents and receiving water are monitored for chemical and radiological parameters. Fish and sediments are tested for radiation annually. The facility's 1989 report stated that only naturally occurring potassium-40 was detected in Glowegee Creek fish. Potassium-40 and daughters of uranium and thorium that were detected in sediment were reported to be naturally occurring radionuclides that are not associated with site operations. Cesium-137 was also detected in sediment. Limited information that was provided states that the facility is in compliance with its discharge permit and with Department of Energy (DOE) regulations governing the release of radiation to the environment. KAPL did not, however, provide information spanning the years of site operations history.

Ref. Nos. 1 through 8, 18

11. Identify and locate the nearest downslope surface water. If possible, include a description of possible surface drainage patterns from the site.

Three named creeks, in addition to intermittent and unnamed surface waters, drain the Kesselring site. Glowegee Creek is the primary receptor of the site's drainage. Based upon topographic mapping, this stream may receive runoff from each of the five waste areas at the site. Glowegee Creek also receives drainage from the site Security Area. The Hogback Road Landfill and Parkis Mills Road Cellar Hole are within 1,000 feet of Glowegee Creek. The other three waste units (Swan School Road Cellar Hole, Baptist Hill Road Landfill, and the Silo Area) are within 1 mile of this surface water. In some instances, runoff from the waste areas may also reach Glowegee Creek via tributaries or intermittent surface waters. Drainage from the

Hogback Road Landfill may also reach Hogback Brook, a tributary of Glowegee Creek. The landfill is located less than 700 feet from Hogback Brook. Discharge points to Glowegee Creek from the Security Area include two surface channels, a stormwater runoff drain, a sewage treatment plant drain line, and possibly, an intermittent surface water. Kayaderosseras Creek, which is east of the site and partially borders the eastern site boundary, recharges a wellfield that serves the facility. Glowegee Creek joins Kayaderosseras Creek at a point approximately 1.2 miles east of the site. Crook Brook, north of Glowegee Creek, also receives drainage from the site. Crook Brook joins Kayaderosseras Creek at a point adjacent to the site wellfield. Kayaderosseras Creek discharges to Saratoga Lake approximately 8 miles downstream of the Kesselring facility.

Ref. Nos. 1 through 8, 18

12. What is the facility slope in percent? (Facility slope is measured from the highest point of deposited hazardous waste to the most downhill point of the waste area or to where contamination is detected.)

Based upon topographic mapping and background information provided by KAPL, estimated facility slopes range from 4 percent to 10.7 percent. It is possible that trenches that may be present at the Hogback Road Landfill would reduce the facility slope from 10.7 percent to a lower value for this waste unit. KAPL considered the five waste units to be either a closed basin or an area of facility slope less than 3 percent.

Ref. Nos. 1 through 8, 18

13. What is the slope of the intervening terrain in percent? (Intervening terrain slope is measured from the most downhill point of the waste area to the probable point of entry to surface water.)

For the three units that present a potential for surface migration, the slope of the intervening terrain is estimated to range from 5.8 percent to 7.7 percent. KAPL considered the waste units to be either a closed basin or an area with an intervening terrain of 5 to 8 percent.

Ref. Nos. 1 through 8, 18

14. What is the 1-year 24-hour rainfall?

The 1-year 24-hour rainfall is 2 inches.

Ref. No. 14

15. What is the distance to the nearest downslope surface water? Measure the distance along a course that runoff can be expected to follow.

Based upon topographic mapping, Hogback Road Landfill, located less than 700 feet from Hogback Brook, represents the shortest distance to downslope surface water.

Ref. Nos. 2, 6 through 8, 18

16. Identify uses of surface waters within 3 miles downstream of the site (i.e., drinking, irrigation, recreation, commercial, industrial, not used).

Within 3 miles downstream of the site, Kayaderosseras Creek is used as:

- An important cold water fishery for trout; the creek is stocked by the state and is heavily fished.
- A location of numerous canoeing, rafting, and whitewater events.



Kayaderosseras Creek, Glowegee Creek and Hogback Brook are classified by New York State as Class C trout streams, which, by definition, "are suitable for fishing, fish propagation, and shall be suitable for primary and secondary contact recreation even though other factors may limit the use for that purpose". The PA described the streams as best suited for fishing and non-contact recreation, and not suited for primary contact recreation such as swimming.

KAPL reported that there are no known surface water intakes to Glowegee Creek. Based upon a telephone conversation referenced in this SI Review, there are no known surface water intakes to Kayaderosseras Creek within 3 miles downstream of the site. The site wellfield that draws from the aquifer recharged by Kayaderosseras Creek may be considered to be fed by surface water due to its shallow depth and proximity to the creek.

Ref. Nos. 1, 2, 11, 15, 16

17. Describe any wetlands, greater than 5 acres in area, within 2 miles downstream of the site. Include whether it is a freshwater or coastal wetland.

KAPL reported that based upon a site environmental impact statement, there are no significant wetlands near the site. Reference information from the environmental impact statement was not provided. National Wetland Inventory Mapping does not exist for this location. The USGS topographic map for this area does not indicate the presence of wetlands contiguous to surface waters within 2 miles downstream of the site. However, the topographic map does indicate that there are two on-site wetland areas that each exceed 5 acres; both are located downslope of site waste areas.

Ref. Nos. 1, 2, 18, 19

18. Describe any critical habitats of federally listed endangered species within 2 miles of the site along the migration path.

KAPL reports that a site environmental impact assessment noted no endangered species. Significant Habitat mapping for this location does not indicate the presence of potential areas of concern.

Ref. Nos. 1, 2, 19

19. What is the distance to the nearest sensitive environment along or contiguous to the migration path (if any exist within 2 miles)?

Based upon information reviewed, there are no known sensitive environments along or contiguous to the migration path, within 2 miles of the site.

Ref. Nos. 18, 19

20. Identify the population served or acres of food crops irrigated by surface water intakes within 3 miles downstream of the site and the distance to the intake(s).

There are no known surface water intakes for potable water or irrigation use within 3 miles downstream of the site.

Ref. Nos. 1, 2, 11, 16

**21. What is the state water quality classification of the water body of concern?**

Kayaderosseras Creek, Glowegee Creek, and Hogback Brook are classified by New York State as Class C trout streams. The classification of Crook Brook was not reported.

Ref. Nos. 1, 2, 15, 16

**22. Describe any apparent biota contamination that is attributable to the site.**

KAPL reported that 1986 radiological monitoring of fish upstream and downstream of site discharge points did not indicate biota contamination attributable to the site. It was also reported that no radiation attributable to 1986 operations was detected in environmental samples. In the site's 1989 monitoring report, potassium-40 detected in fish was reported to be naturally occurring, and not associated with site operations. The reports concluded that no adverse effects on Glowegee Creek aquatic life quality have resulted from site operations.

Ref. Nos. 1, 2, 4, 5

**AIR ROUTE****23. Describe the likelihood of a release of contaminant(s) to the air as follows: observed, alleged, potential, none. Identify the contaminant(s) detected or suspected, and provide a rationale for attributing the contaminant(s) to the facility.**

Potential air contaminants include radionuclides and oil combustion emissions. Among the potential radiological and chemical contaminants of concern are cobalt-60, carbon-14, xenon, krypton, argon-41, and sulfur. Air emissions may result from operations associated with the site reactors, cooling towers, oil-fueled boilers, and shop activities. Gaseous effluents are monitored for particulate radioactivity, chemical parameters, smoke emissions, and opacity. KAPL reported that the Kesselring site has maintained a high degree of compliance with permit requirements. It was reported that there was no evidence of releases via the air route that showed contaminant levels exceeding background concentrations.

Ref. Nos. 1, 2, 4, 5

**24. What is the population within a 4-mile radius of the site?**

KAPL did not report the population within a 4-mile radius of the site. Based upon USGS topographic mapping and GEMS, the population within a 4-mile radius of the site is approximately 6,900 people.

Ref. Nos. 13, 18

**FIRE AND EXPLOSION****25. Describe the potential for a fire or explosion to occur with respect to the hazardous substance(s) known or suspected to be present on site. Identify the hazardous substance(s) and the method of storage or containment associated with each.**

KAPL did not address the potential for a fire or explosion to occur. Based upon known site activities, a potential for a fire or explosion may exist due to:

- Specific hazards associated with the site reactors and associated structures and operations.
- Laboratory activities that utilize various chemical substances.

- Storage of chemical substances, wastes, and petroleum products. (Chemical waste storage also includes the waste units that once received a variety of chemical wastes).

The Kesselring Site maintains fire trucks on site, and has full-time firefighters. The facility also has mutual aid agreements with neighboring fire districts.

Ref. Nos. 1, 2, 4, 5

26. What is the population within a 2-mile radius of the hazardous substance(s) at the facility?

KAPL did not report the population within a 2-mile radius of hazardous substances. Based upon U.S.G.S. topographic mapping and GEMS, the population within a 2-mile radius of hazardous substances is approximately 500 people.

Ref. Nos. 13, 18

#### DIRECT CONTACT/ON-SITE EXPOSURE

27. Describe the potential for direct contact with hazardous substance(s) stored in any of the waste units on site or deposited in on-site soils. Identify the hazardous substance(s) and the accessibility of the waste unit.

KAPL reported that the site Security Area and Hogback Road Landfill are fenced, thus limiting unauthorized access to these areas. It was also noted that personnel are provided with hazardous materials training. A map indicates the presence of a chain-link fence around the site. Further information regarding site security and direct contact potential was not provided. It would be expected, however, that site security is maintained due to the nature of the site's operations.

Ref. Nos. 1, 2, 4, 5

28. How many residents live on a property whose boundaries encompass any part of an area contaminated by the site?

According to KAPL, site operations have not resulted in off-site contamination.

Ref. Nos. 1, 2, 4, 5

29. What is the population within a 1-mile radius of the site?

KAPL did not report the population within a 1-mile radius of the site. Based upon USGS topographic mapping and GEMS, there are no residents within a 1-mile radius of the site Security Area. Approximately 200 people may reside within a 1-mile radius of the site's five identified waste units.

Ref. Nos. 13, 18

CONFIDENTIAL-NOT FOR PUBLIC RELEASE

HRS

	S	S <sup>2</sup>
Groundwater Route Score (S <sub>gw</sub> )	70.92	5029.65
Surface Water Route Score (S <sub>sw</sub> )	8.62	74.30
Air Route Score (S <sub>a</sub> )	—	—
$S_{gw}^2 + S_{sw}^2 + S_a^2$		5103.95
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		71.44
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} / 1.73 = S_M =$		41.30

WORKSHEET FOR COMPUTING S<sub>M</sub>

PRO

	S	S <sup>2</sup>
Groundwater Route Score (S <sub>gw</sub> )	79.43	6309.12
Surface Water Route Score (S <sub>sw</sub> )	14.48	209.67
Air Route Score (S <sub>a</sub> )	—	—
$S_{gw}^2 + S_{sw}^2 + S_a^2$		6518.79
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		80.74
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} / 1.73 = S_M =$		46.67

WORKSHEET FOR COMPUTING S<sub>M</sub>

# CONFIDENTIAL-NOT FOR PUBLIC RELEASE

Ground Water Route Work Sheet							
Rating Factor	Assigned Value (Circle One)	Multi-plier	HRS	Max. Score	PRO		
<b>1</b> Observed Release	0 45	1	0	45	45		
If observed release is given a score of 45, proceed to line <b>4</b> . If observed release is given a score of 0, proceed to line <b>2</b> .							
<b>2</b> Route Characteristics							
Depth to Aquifer of Concern	0 1 2 3	2	6	6	6		
Net Precipitation	0 1 2 3	1	2	3	2		
Permeability of the Unsaturated Zone	0 1 2 3	1	3	3	3		
Physical State	0 1 2 3	1	3	3	3		
Total Route Characteristics Score			14	15	14		
<b>3</b> Containment	0 1 2 3	1	3	3	3		
<b>4</b> Waste Characteristics							
Toxicity/Persistence	0 3 6 9 12 15 18	1	18	18	18		
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1	4	8	5		
Total Waste Characteristics Score			22	26	23		
<b>5</b> Targets							
Ground Water Use	0 1 2 3	3	9	9	9		
Distance to Nearest Well/Population Served	0 4 6 8 10 12 16 18 20 24 30 32 35 40	1	35	40	35		
Total Targets Score			44	49	44		
<b>6</b> If line <b>1</b> is 45, multiply <b>1</b> x <b>1</b> x <b>5</b> If line <b>1</b> is 0, multiply <b>2</b> x <b>3</b> x <b>4</b> x <b>5</b>			40656	57.330	45540		
<b>7</b> Divide line <b>6</b> by 57.330 and multiply by 100			Sgw = 70.92		79.43		

Pro = 1

HRS = 0



# CONFIDENTIAL-NOT FOR PUBLIC RELEASE

Surface Water Route Work Sheet							
Rating Factor	Assigned Value (Circle One)	Multi-plier	HRS	Max. Score	PRO		
<b>1</b> Observed Release	0 45	1	0	45	45		
If observed release is given a value of 45, proceed to line <b>4</b> . If observed release is given a value of 0, proceed to line <b>2</b> .							
<b>2</b> Route Characteristics							
Facility Slope and Intervening Terrain	0 1 2 3	1	3	3	3		
1-yr. 24-hr. Rainfall	0 1 2 3	1	2	3	2		
Distance to Nearest Surface Water	0 1 2 3	2	6	8	6		
Physical State	0 1 2 3	1	3	3	3		
Total Route Characteristics Score			14	15	14		
<b>3</b> Containment	0 1 2 3	1	3	3	3		
<b>4</b> Waste Characteristics							
Toxicity/Persistence	0 3 6 9 12 15 18	1	18	18	18		
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1	4	8	5		
Total Waste Characteristics Score			22	28	23		
<b>5</b> Targets							
Surface Water Use	0 1 2 3	3	6	9	9		
Distance to a Sensitive Environment	0 1 2 3	2	0	8	0		
Population Served/Distance to Water Intake Downstream	0 4 6 8 10 12 16 18 20 24 24 30 32 35 40	1	0	40	0		
Total Targets Score			6	55	9		
<b>6</b> If line <b>1</b> is 45, multiply <b>1</b> x <b>4</b> x <b>5</b> If line <b>1</b> is 0, multiply <b>2</b> x <b>3</b> x <b>4</b> x <b>5</b>			5544	64.350	9315		
<b>7</b> Divide line <b>6</b> by 64.350 and multiply by 100			S <sub>sw</sub> = 8.62		14.48		

PRO = ☐

HRS = 0